Potential Implications of TMDL/NPDES Initiatives on Coal-Based Power Systems

U.S. Department of Energy

National Energy Technology Laboratory

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Purpose

- **Update recent water-related regulatory developments that could impact coal-based power systems**

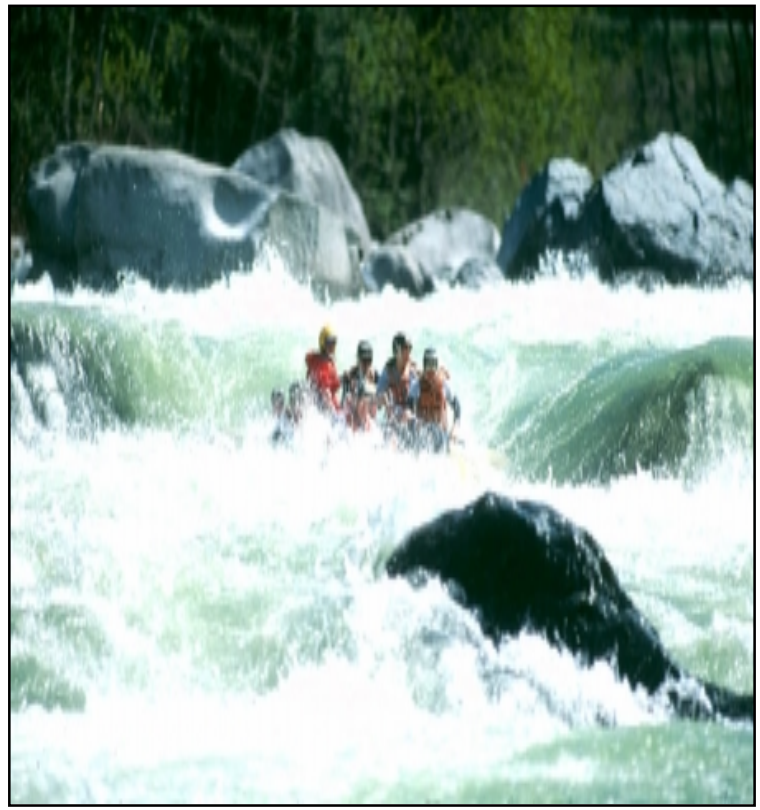
Outline

- Background
- TMDL
- NPDES
- Next Steps

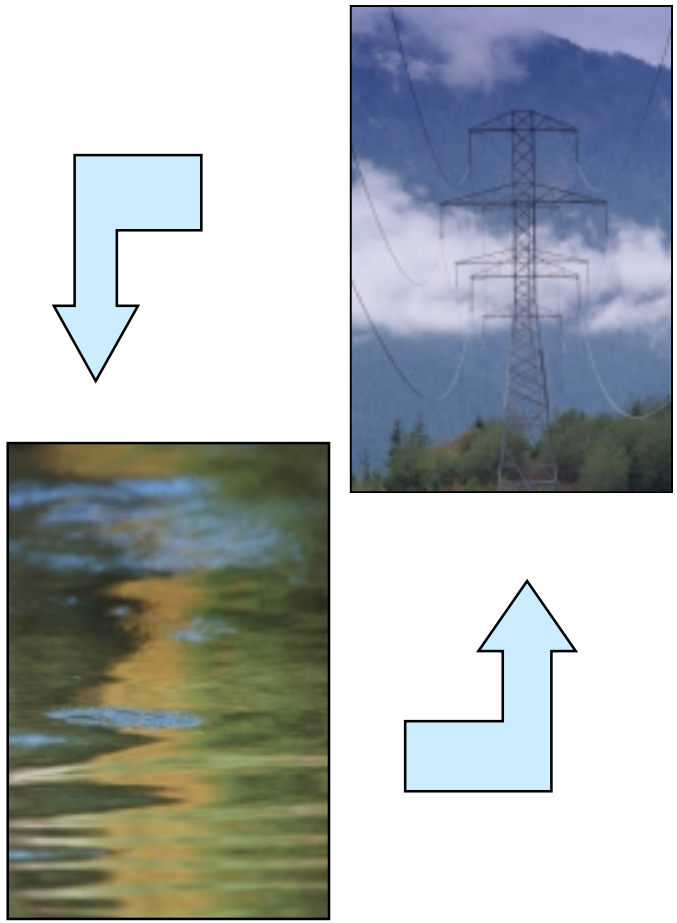
Background

- **Part of a larger, on-going "cradle-to-grave" analysis of the impact of environmental regulations on the production, transportation, and utilization of coal.**

- **Support of the FY01 Innovations for Existing Plants (formerly Advanced Research & Technology Development) Program.**



Energy and Water



- 70 trillion gallons (2.8 x 10^{11} tons) of water are consumed or impacted annually to produce energy.
- About 3.3 gallons of water are needed for each kWh generated from coal.
- About 80% of the cost of water is due to energy for treatment and delivery.

Clean Water Act

- **The overall goal is to *"restore and maintain the chemical, physical, and biological integrity of the Nation's water."***

Total Maximum Daily Load (TMDL)

- **Established under Section 303**
- **A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources, i.e., a pollution budget.**
- **A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and non-point sources.**

Source: U.S. EPA, Office of Water

TMDL - What's New

- **EPA Administrator signed final TMDL rule on July 11, 2000**
- **States will have to develop TMDLs and implementation plans to achieve compliance (i.e.,clean up impaired waters)**
- ***New commitment to reducing non-point pollution sources!***

Source: U.S. EPA, Office of Water

TMDL
Non-Point Sources

- **Non-point pollution include atmospheric emissions from large industrial sources such as coal-fired power plants.**

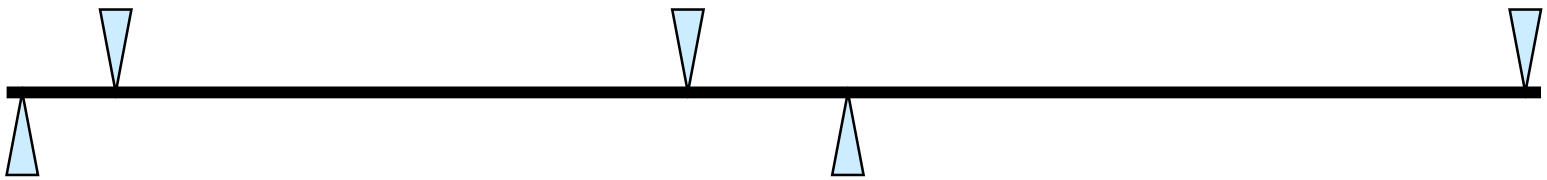
TMDL Schedule

Key Milestones

Summer 2001
Lessons Learned
Report on TMDL
Pilot Projects

July 11, 2010
States develop
TMDLs and
implementation plans

July 11, 2020
Full compliance



July 11, 2000
Carol Browner signs
Final TMDL Rule

July 11, 2012
States issue NPDES
permits

Impact of Atmospheric Deposition on Water Bodies

Water Body	% of Impairment Due to Atmospheric Deposition
Rivers and streams	**NA**
Lakes, Reservoirs, and Ponds	**7%**
Estuaries	**24%**
Great Lakes	**22%**
Ocean Shoreline	**NA**

NA - Atmospheric deposition is not currently considered a leading source of water-quality impairment.

Source: U.S. EPA, *"The Quality of Our Nation's Water -- A Summary of the National Water Quality Inventory:1998 Report to Congress,"* EPA841-S-00-001, June 2000.

TMDL

How Might It Affect Power Plants?

- **Atmospheric emissions from coal-fired power plants will come under increased scrutiny.**
- **Power plants may be required in the future to reduce atmospheric emissions as part of TMDL implementation plans.**

TMDL

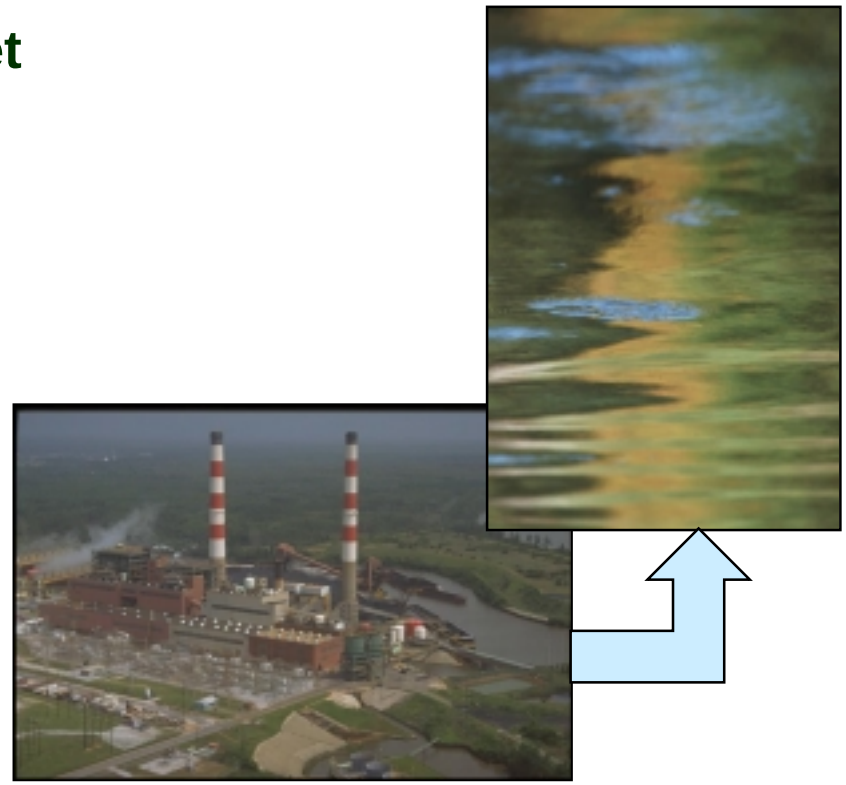
How Might It Affect Power Plants?

- **Increased use of SNCR and SCR to control NOx will lead to higher concentrations of NH_3 in fly ash.**

- **This in turn could lead to wastewater issues in terms of the release of soluble ammonia to water bodies.**

EPA's Air-Water Interface Work Plan

- **Proposed plan to ratchet down emissions from facilities near impaired waters**
- **Focused on NOx and mercury emissions**
- **Tied to EPA's TMDL program**



Source: *Draft Air-Water Interface Work Plan*, U.S. EPA, July 2000.

TMDL Pilot Projects

- EPA is conducting pilot studies on two impaired water bodies -- Devil's Lake in Wisconsin and a portion of the Florida Everglades.
- Investigate the relationship between air emissions of mercury and water-quality impacts.
- Test methods for the development of State TMDLs for mercury from air sources.

National Pollutant Discharge Elimination System (NPDES)

- **The purpose of the NPDES program is to protect human health and the environment by requiring all point sources to obtain permits to discharge pollutants into water bodies.**

- **These permits contain enforceable limitations and requirements that ensure that water quality standards will be met.**

Point source is defined by EPA to mean a discrete conveyance such as a pipe or a man-made ditch.

NPDES
What's New?

- **On August 23, 1999, EPA proposed new NPDES Regulations.**
- **The purpose of the NPDES regulations is to ensure that the new TMDL program is implemented.**

NPDES
What's New?

- **Under the new rules, States authorized to administer the NPDES program may designate non-point sources as point sources and require that they obtain a NPDES permit.**

- **EPA is also seeking to require dischargers to offset new pollutant loads to impaired water bodies to offset their new dischargers. The offset can come from either point or non-point sources.**

NPDES

How Might it Affect Power Plants?

- **Power plants must already obtain NPDES point-source permits for aqueous discharges.**

- **However, the new NPDES rule, in conjunction with the revised TMDL program, could lead to the requirement of NPDES permits for atmospheric emissions, particularly for mercury and NOx, from non-point sources, i.e., power plants.**

TMDL/NPDES

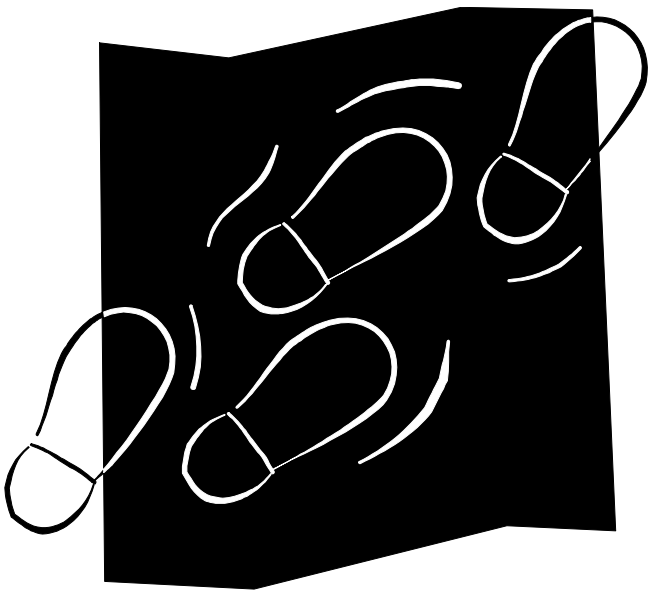
What is NETL Currently Doing?

- **In FY98, NETL initiated a collaborative research effort with TVA to assess the impact of N_2 deposition on the Noland Divide watershed in the Great Smoky Mountains.**

- **In FY99, NETL initiated wet deposition mercury sampling at the Holbrook (PA) $PM_{2.5}$ monitoring site as part of the national Mercury Deposition Monitoring program.**

TMDL/NPDES

Next Steps?



- **Expand NETL's ambient monitoring effort to include sensitive watersheds, such as the Great Lakes and Chesapeake Bay, as well as key atmospheric pollutants including nitrogen and air toxics.**

- **Continue to follow closely EPA's initiatives related to the TMDL program, e.g., Air-Water Interface, Great Lakes Initiative, Hg deposition pilot projects.**

TMDL/NPDES

Next Steps?

- **Investigate impact of new air emissions regulations (i.e., NOx SIP Call, Hg regulatory determination) on coal-combustion byproducts.**

- **Determine the need for improved technology for treating/removing ammonia and mercury from electric-utility process waters and leachates.**